Magnet URI scheme

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Inverted magnet icon

The **Magnet URI scheme** is a de facto standard defining a URI scheme for Magnet links, which mainly refer to resources available for download via peer-to-peer networks. Such a link typically identifies a file not by location, but by content—more precisely, by the content's cryptographic hash value.

Since it specifies a file based on content or metadata, rather than by location, a Magnet link can be considered a kind of Uniform Resource *Name*, rather than the more common Uniform Resource *Locators*. Although it could be used for other applications, it is particularly useful in a peer-to-peer context, because it allows resources to be referred to without the need for a continuously available host.

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History [edit]

The standard for Magnet URIs was developed by Bitzi in 2002, partly as a "vendor- and project-neutral generalization" of the `ed2k:` and `freenet:` URI schemes used by eDonkey2000 and Freenet, respectively, and attempts to follow official IETF URI standards as closely as possible.

Applications supporting Magnet links include µTorrent, aMule, BitComet, Bitflu, BitSpirit, BitTorrent, DC++, Deluge, FrostWire, gtk-gnutella, Installous (iOS app), I2P, KTorrent, MLDonkey, Morpheus, Qbittorrent, rTorrent, Shareaza, Tixati, Transmission, Tribler, Xtorrent, Free Download Manager[1] and Vuze.

Rounded magnet icon used on The Pirate Bay

The Pirate Bay migrated from .torrent files to magnet URI in February 2012. This migration made the storage footprint of The Pirate Bay exceptionally small. A user demonstrated that the total size of The Pirate Bay magnets would be approximately 90MB of compressed data.[2]

Use of content hashes [edit]

The most common use of Magnet URIs is to point to a particular file based on a hash of its contents, producing a unique identifier for the file, similar to an ISBN or catalog number. Unlike traditional identifiers, content-based signatures can be generated by anyone who already has the file, without the need for a central authority to issue them. This makes them popular for use as "guaranteed" search terms within the file sharing

community where anyone can distribute a Magnet link to ensure that the resource retrieved by that link is the one intended, regardless of how it is retrieved. While it is theoretically possible for two files to have the same hash value (known as a "hash collision"), cryptographic hash functions are designed to reduce that occurrence to a practical impossibility – even if an expert with vast computational resources is intentionally looking for two files with the same hash value.

Another advantage of Magnet URIs is their open nature and platform independence: the same Magnet link can be used to download a resource from numerous applications on almost any operating system. Because they are concise and plain-text, users can copy-and-paste them into e-mails or instant messages, a property not found in, for example, BitTorrent files.

Technical description [edit]

Magnet URIs consist of a series of one or more parameters, the order of which is not significant, formatted in the same way as query strings that ordinarily terminate HTTP URLs. The most common parameter is "xt" ("exact topic"), which is generally a URN formed from the content hash of a particular file, e.g.

`magnet:?xt=urn:sha1:YNCKHTQCWBTRNJIV4WNAE52SJUQCZO5C`

This refers to the Base32 encoded SHA-1 hash of the file in question. Note that, although a particular file is indicated, an availability search for it must still be carried out by the client application.

Other parameters defined by the draft standard are:

- "dn" ("display name"): a filename to display to the user, for convenience
- "kt" ("keyword topic"): a more general search, specifying search terms, rather than a particular file
- "mt" ("manifest topic"): a URI pointing to a "manifest", e.g. a list of further items
- application-specific experimental parameters, which must begin "x."

The standard also allows for multiple parameters of the same type to be used by appending ".1", ".2", etc. to the parameter name, e.g.: `magnet:?xt.1=urn:sha1:YNCKHTQCWBTRNJIV4WNAE52SJUQCZO5C&xt.2=urn:sha1:TXGCZQTH26NL6OUQAJJPFALHG2LTGBC7`

Design [edit]

Magnet URIs can contain multiple parameters, in any order, separated from each other by '&'.

magnet:? xl = [Size in Bytes] & dn = [file name (URL encoded)] & xt = urn: tree: tiger: [TTH hash (Base32)]

Parameters [edit]

- dn (Display Name) – Filename
- xl (eXact Length) – Size in bytes
- xt (eXact Topic) – URN containing file hash
- as (Acceptable Source) – Web link to the file online
- xs (eXact Source) – P2P link.
- kt (Keyword Topic) – Key words for search
- mt (Manifest Topic) – link to the metafile that contains a list of magneto (MAGMA – MAGnet MAnifest)
- tr (address TRacker) – Tracker URL for BitTorrent downloads

URN, containing hash (xt) [edit]

"xt" ("exact topic"): the most important part of a Magnet link, this parameter is used to find and verify the specified files.

TTH (Tiger Tree Hash)

These hashes are used on Direct Connect and G2 (Gnutella2), among others.

xt=urn:tree:tiger:[TTH Hash (Base32)]

SHA-1 (Secure Hash Algorithm 1)

These hash sums are used on gnutella and G2 (Gnutella2).

xt=urn:sha1:[SHA-1 Hash (Base32)]

BitPrint

Such hash sums consist of an SHA-1 Hash, followed by a TTH Hash, delimited by a point; they are used on gnutella and G2 (Gnutella2).

xt=urn:bitprint:[SHA-1 Hash (Base32)].[TTH Hash (Base32)]

ED2K (eDonkey2000) Hash

These hash sums are used on eDonkey2000.

xt=urn:ed2k:[ED2K Hash (Hex)]

AICH (Advanced Intelligent Corruption Handler)

Not formal URNs for Magnet links, such hash sums are used by eDonkey2000 to restore and control the integrity of downloading and already downloaded files.

xt=urn:aich:[aich Hash (Base32)]

Kazaa Hash

Used on FastTrack, these hash sums are vulnerable to hash collision attacks.

xt=urn:kzhash:[Kazaa Hash (Hex)]

BTIH (BitTorrent Info Hash)

These are hex encoded SHA1 hash sums of the "info" sections of BitTorrent metafiles as used by BitTorrent to identify downloadable files or sets of files. For backwards compatibility with existing links, clients should also support the Base32 encoded version of the hash.[3]

xt=urn:btih:[BitTorrent Info Hash (Hex)]

Some clients require Base32 of info_hash (Vuze for ex.).

MD5 (Message Digest 5)

Supported by G2 (Gnutella Peanut Butter), such hashes are vulnerable to hash collision attacks.

xt=urn:md5:[MD5 Hash (Hex)]

Web links to the file [edit]

There are two types of download links that a Magnet link can include as a direct or backup source.

Normal (as) [edit]

"as" ("acceptable source") refers to a direct download from a web server. Regarded as only a fall-back source in case a client is unable to locate and/or download the linked-to file in its supported P2P network(s), most clients treat it equal to the "xs" token when it comes to priority, and ignore the timeout before contacting "as" sources denoted by the specs.

as=[a web link to the file(URL encoded)]

P2P (xs) [edit]

"xs" ("exact source") is either an HTTP (or HTTPS, FTP, FTPS, etc.) download source for the file pointed to by the Magnet link, the address of a P2P source for the file or the address of a hub (in the case of DC++), by which a client tries to connect directly, asking for the file and/or its sources. This field is commonly used by P2P clients to store the source, and may include the file hash.

Content-Addressable Web[4] URL

This type of RFC 2168 -based link is used by gnutella as well as G2 applications.

```
xs=http://[Client Address]:[Port of client]/uri-res/N2R?[ URN containing a file hash ]
```

Example:

```
:xs=http://192.0.2.27:6346/uri-res/N2R?urn:sha1:FINYVGHENTHSMNDSQQYDNLPONVBZTICF
```

Link to a DirectConnect hub to find sources for a file

This type of link connects a DirectConnect client immediately to the hub in question.

xs=dchub://[hub address]:[hub port]

Reference to a web-based source cache for a file on Gnutella2

In this case, the included link points, not to a client IP or direct source, but to a source cache which stores the IPs of other clients contacting it to download the same file. Once a client connects to the cache, it is served IPs for alternate sources, while its own IP is stored within the cache and forwarded to the next one connecting to the cache. This system operates similar to a BitTorrent tracker.

xs=http://cache.freebase.be/[SHA-1 hash]

Reference to an eD2k source

xs=ed2kftp://[client address]:[client port]/[ed2k hash]/[file size]/

Manifest (mt) [edit]

This is a link to a list of links (see list). Perhaps as a web link...

mt=http://weblog.foo/all-my-favorites.rss

...or a URN

mt=urn:sha1:3I42H3S6NNFQ2MSVX7XZKYAYSCX5QBYJ

Keywords (kt) [edit]

This field specifies a string of search keywords to search for in P2P networks.

kt=joe+blow+mp3

Address tracker (tr) [edit]

Tracker URL; used to obtain resources for BitTorrent downloads without a need for DHT support.[3]

tr=http://example.com/announce

Supplement format (x.) [edit]

For experimental and self-complementing informal options, the prefix x followed by a chosen second letter can be used.

x.[name of the new parameter]=[data of the new parameter (URL encoded)]

Group settings [edit]

Multiple files and their URNs, names and hashes in the Magnet link can be included by adding a count number preceded by a dot (".") to each link parameter.

magnet:?xt.1=[URN of the first file]&xt.2=[URN of the second file]

Examples [edit]

Link to a file of zero bytes length [edit]

```
magnet:?xt=urn:ed2k:31D6CFE0D16AE931B73C59D7E0C089C0
&xl=0&dn=zero_len.fil
&xt=urn:bitprint:3I42H3S6NNFQ2MSVX7XZKYAYSCX5QBYJ
.LWPNACQDBZRYXW3VHJVCJ64QBZNGHOHHHZWCLNQ
&xt=urn:md5:D41D8CD98F00B204E9800998ECF8427E
```

mediawiki-1.15.1.tar.gz [edit]

```
magnet:?xt=urn:ed2k:354B15E68FB8F36D7CD88FF94116CDC1
&xt=urn:tree:tiger:7N5OAMRNGMSSEUE3ORHOKWN4WWIQ5X4EBOOTLJY
&xt=urn:btih:QHQXPYWMACKDWKP47RRVIV7VOURXFE5Q
&xl=10826029&dn=mediawiki-1.15.1.tar.gz
&tr=udp%3A%2F%2Ftracker.openbittorrent.com%3A80%2Fannounce
&as=http%3A%2F%2Fdownload.wikimedia.org%2Fmediawiki%2F1.15%2Fmediawiki-1.15.1.tar.gz
&xs=http%3A%2F%2Fcache.example.org%2FXRX2PEFXOOEJFRVUCX6HMZMKS5TWG4K5
&xs=dchub://example.org
```

Features and Clients [edit]

Parameters:

```
dn (Display Name) - Filename
xl (Exact Length) - Size in bytes
xt (Exact Topic) - URN containing file hash
as (Acceptable Source) - Web link to the file online
xs (Exact Source) - P2P link.
kt (Keyword Topic) - Key words for search
mt (Manifest Topic) - link to the metafile that contains a list of magneto (MAGMA - MAGnet MAnifest)
tr (Address Tracker) - Tracker URL for BitTorrent downloads
```

Clients table [edit]

Client	dn	xl	xt	tr	xs	as	kt	mt	Interception[Note 1]	Box[Note 2]
AMule	Yes	Yes	urn:ed2k :	No	Unknown	Unknown	Unknown	Unknown	No	Yes
ApexDC++	Yes	Yes	urn:bitprint : urn:tree:tiger :	No	Dchub:[Note 3]	Dchub:[Note 3]	No	Unknown	Yes	No
aria2	Yes	Unknown	urn:btih :	Yes	Unknown	Unknown	Unknown	Unknown	No	Unknown
BitComet	Yes	Yes	urn:btih :	Yes	No	No	No	No	Yes	Yes
Bitflu	Yes	No	urn:btih :	Yes	No	No	No	No	No	No
Deluge	Yes	No	urn:btih :	Yes	No	No	No	No	Yes	Yes
FlylinkDC++	Yes	Yes	urn:bitprint : urn:tree:tiger :	No	Dchub:[Note 3]	Dchub:[Note 3]	Yes	Unknown	Yes	No
gtk-gnutella	Yes	Yes	urn:sha1 :	No	http: push:	Yes	Yes	No	No	Yes
KTorrent	Yes	No	urn:btih :	Yes	No	No	No	No	Yes	Yes
LimeWire	Yes	Yes	urn:sha1 :	No	http: urn:guid :	Unknown	No	No	Yes	Yes
MiniGet	Yes	No	urn:btih :	Yes	No	No	No	No	Yes	Yes
µTorrent	Yes	No	urn:btih :	Yes	No	No	No	No	Yes	Yes
Shareaza	Yes	Yes	urn:bitprint : urn:btih : urn:ed2k : urn:md5 : urn:sha1 : urn:tree:tiger :	Yes [Note 4]	http: ftp:	http: ftp: (Same priority as xs)	Yes	No	Yes	Yes
Transmission[5][6]	Yes	No	urn:btih :	Yes	No	No	No	No	Yes	Yes
Vuze	Yes	Yes	urn:btih :	Yes	Yes	No	No	No	Yes	Yes

Notes [edit]

1. ^ Ability to intercept Magnet links directly from within the web browser. i.e. When a Magnet link is entered into the address bar, the application will intercept the link and try to open the link itself. So if a compatible client is installed on your computer and you enter a Magnet link into your browser address bar, a window pops up asking if you want to allow that client to open the link.
2. ^ Possibility to inject the link directly into the application in question.
3. ^ a b c d Dchub://[hubaddress]:[hubport]
4. ^ Since v2.5.1.0

Shareaza [edit]

This client is able to intercept links from within the web browser and can also handle Magnet links pasted into the search area or the "Download File or Torrent" dialogue.

aMule 2.2 [edit]

Unable to intercept Magnet links from within a web browser, this client supports Magnets by offering a text box at the bottom of the client into which they can be copied and pasted. The client is able only to recognize eD2k hash, file size and name in a specific order and therefore, many valid links may not be suitable for downloading.

See also [edit]

- Burnbit
- ed2k URI scheme
- Metalink
- Named data networking

References [edit]

1. ^ http://freedownloadmanager.org/board/viewtopic.php?f=1&t=16625
2. ^ http://www.myce.com/news/the-pirate-bay-will-cease-hosting-most-torrent-files-in-february-58667/
3. ^ a b BEP-9: Extension for Peers to Send Metadata Files
4. ^ Chapweske, Justin (November 29, 2001). "HTTP Extensions for a Content-Addressable Web" . *www-talk*. W3C.
5. ^ "magnet-test.c in trunk/libtransmission; Revision 9531". Transmission.
6. ^ "magnet.c in trunk/libtransmission; Revision 9979". Transmission.

External links [edit]

- Magnet-URI Project website
- Bitzi a Magnet search engine / directory.
- Freebase a website that uses magnet links to index freeware.
- CHK Freeware Checksum Utility with SHA1-Base32 and ED2K support
- RHash an open source command-line tool, which can calculate Magnet links.
- Mgnet.me Torrent Magnet URI shortening tool
- Torrent2Magnet Convert Torrent File To Magnet URI
- magnet2torrent.me Magnet Link to Torrent File Converter
- MagnetToTorrent Free Magnet to Torrent Converter

v· t· e·	URI scheme
Official	aaa · aaas · about · acap · cap · cid · crid · data · dav · dict · dns · fax · file · ftp · geo · go · gopher · h323 · http · https · iax · im · imap · info · ldap · mailto · mid · news · nfs · nntp · pop · rsync · pres · rtsp · sip · S-HTTP · sips · snmp · tag · tel · telnet · tftp · urn · view-source · wais · ws · wss · xmpp ·
Unofficial	afp · aim · apt · bolo · bzr · callto · coffee · cvs · daap · dsnp · ed2k · feed · fish · gg · git · gizmoproject · irc · ircs · itms · javascript · ldaps · **magnet** · mms · msnim · secondlife · skype · spotify · ssh · svn · sftp · smb · sms · steam · webcal · winamp · wyciwyg · xfire · ymsgr ·
Protocol list	

v· t· e·		Peer-to-peer file sharing
Networks and protocols	Centralized	Advanced Direct Connect · Audiogalaxy · CuteMX · Direct Connect · Napster · Opennap · Soribada · Soulseek ·
	Decentralized	Advanced Direct Connect · Ares · BitTorrent · eDonkey · FastTrack · Freenet · GNUnet · Gnutella · Gnutella2 · I2P · Kad · Kazaa · Morpheus · OpenFT · Overnet · Tribler · WASTE · WinMX ·
Comparisons of clients		Advanced Direct Connect · BitTorrent · Direct Connect · eDonkey · gnutella · Gnutella2 ·
Hyperlinks		eD2k · **Magnet** · Metalink ·
Uses		Broadcatching · Music download · Photo sharing · Disk sharing · Peercasting · Web hosting (freesite) ·
Concepts	Privacy	Friend-to-friend · Darknet · Open Music Model · Anonymous P2P · Private P2P ·

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